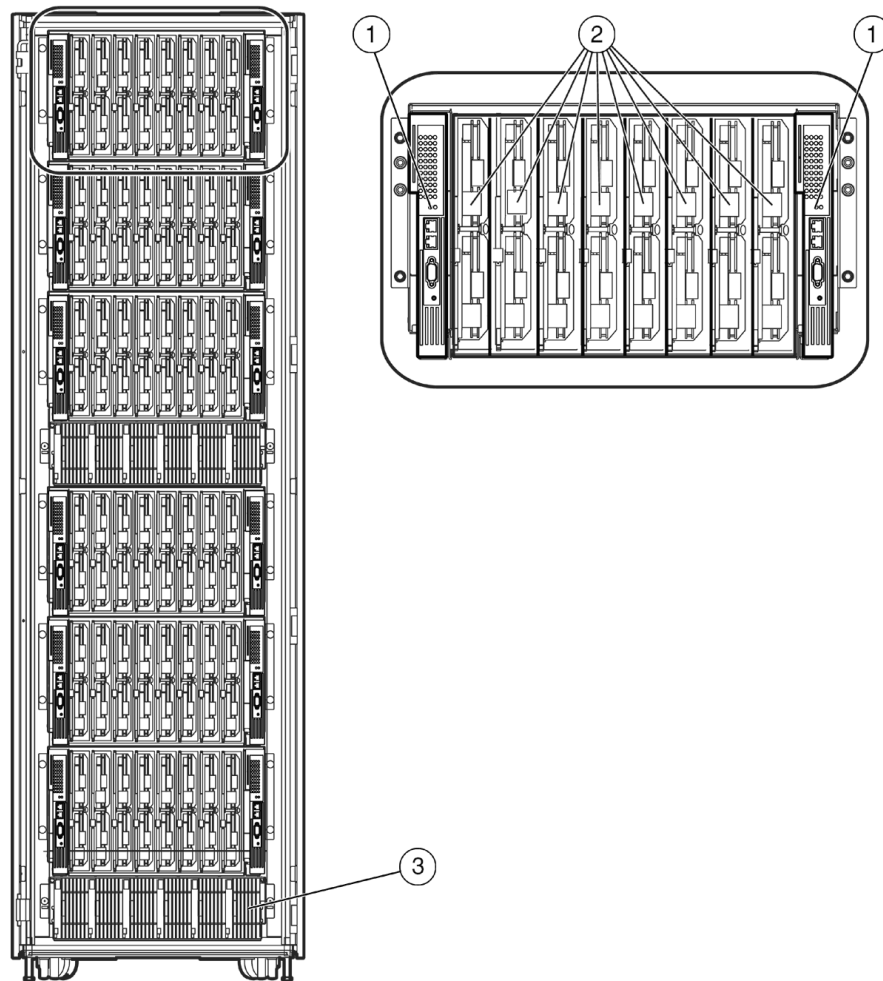*Overview*

42U Rack with ProLiant BL p-Class System Installed

1. BL p-Class interconnects (2) in BL p-Class Server Blade enclosure (interconnect switch shown)
2. BL20p server blades (8) in BL p-Class Server Blade enclosure
3. BL p-Class power enclosure with hot-plug power supplies (6)
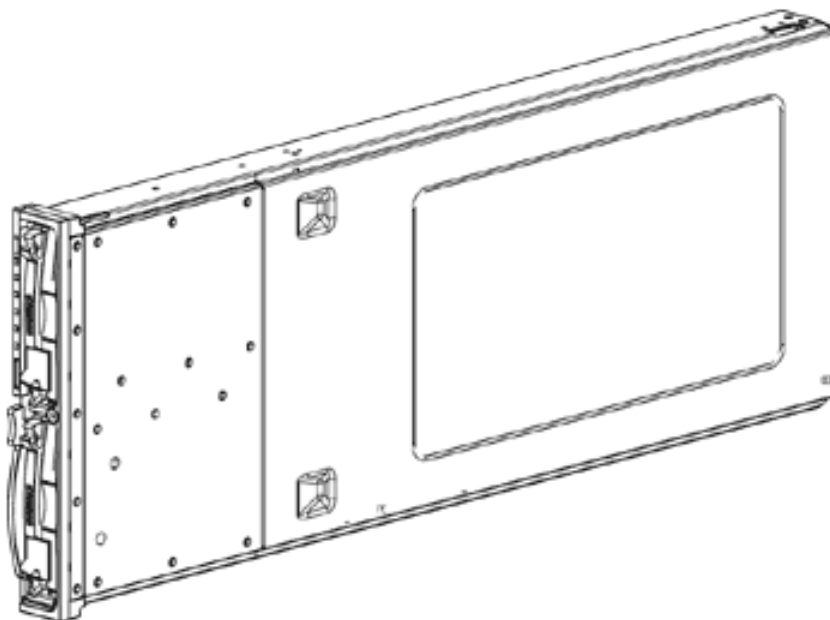
What's New

- GbE2 Interconnect Switch option for Gigabit Ethernet network adapter consolidation and future layer 3-7 and 10 Gigabit Ethernet expandability

QuickSpecs

HP ProLiant BL20p p-Class Server Blade
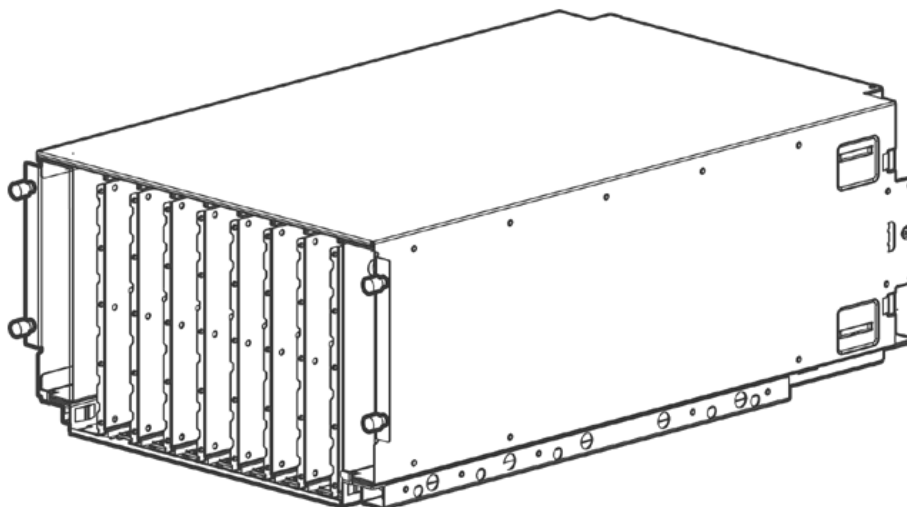
Overview

At A Glance

- Performance dual processor server blade designed with enterprise availability

- **ProLiant BL20p Server Blade includes:**
  - Intel® Pentium® III FC-PGA2 1.40 GHz processor (dual capability)
  - ServerWorks HE- SuperLite Chipset
  - 512-MB or 1024-MB PC133-MHz Registered ECC SDRAM memory, (2 x 1 Interleaved Memory), expandable to 4 GB
  - Three NC3163 Fast Ethernet 10/100T NICs (embedded) with WOL (Wake On LAN) and PXE (Preboot eXecution Environment)
  - Two NICs are upgradeable to 10/100/1000T using the Dual Gigabit Ethernet NC7780 NIC option kit
  - One additional 10/100 port dedicated to Integrated Lights-Out (iLO) Management
  - Smart Array 5i Controller with optional battery-backed write cache
  - Wide Ultra3 SCSI Drive Cage standard supports up to two 1" Wide Ultra3 or Ultra 320 hot plug hard drives
  - Integrated Lights-Out (iLO) Advanced Management (ASIC on motherboard)
  - Plugs vertically into 6U enclosure
  - Up to 48 BL20p blades fit in 42U rack
- **ProLiant BL p-Class Server Blade Enclosure:**
  - Server blades and interconnects blind mate into server blade enclosures for network connection and power
  - Server blade enclosure is 6U and holds up to 8 ProLiant BL20p server blades and 2 interconnects
  - 2 types of interconnects available: interconnect switches or patch panels
- **ProLiant BL p-Class Power Enclosure:**
  - Use BL p-Class sizing tool to determine power based on your configuration
  - http://h30099.www3.hp.com/configurator/calc/Power%20Calculator%20Catalog.xls
  - BL p-Class power enclosure provides shared, external, redundant power
  - Power enclosure is 3U and holds up to 6 hot-plug power supplies
  - Choose single-phase or three-phase power
  - BL p-Class power enclosure with power supplies not needed if using facility
  - -48VDC ± 10% in this case purchase DC option kit
- **ProLiant BL p-Class Power Distribution:**
  - Distributes power from the power enclosure to the server blade enclosures
  - Three power distribution choices:
    - BL p-Class scalable bus bar
    - BL p-Class mini bus bar
    - BL p-Class power bus box
- BL p-Class server blade, server blade enclosure, interconnects and power enclosure protected by a limited three year warranty with optional service uplifts available

- **NOTE:** Power requirements for a ProLiant BL p-Class system: 200V - 240V AC, 30 amp or facility DC -48V ± 10%.

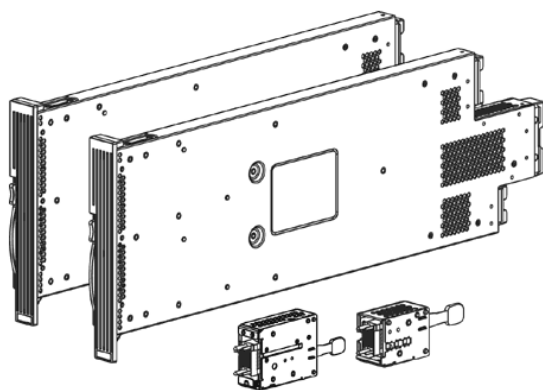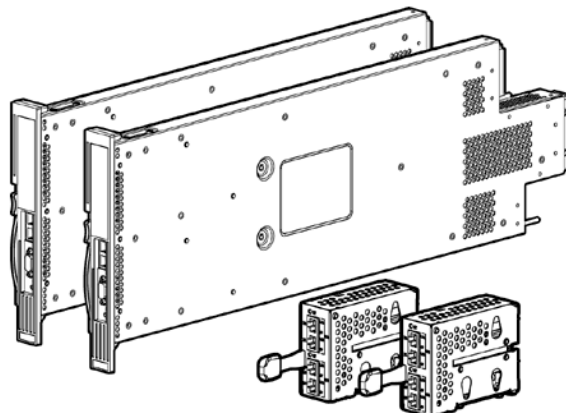*Overview*

ProLiant BL20p Server Blade
+

BL p-Class Server Blade Enclosure
+

Overview

OR

Patch panel

Interconnect Switch
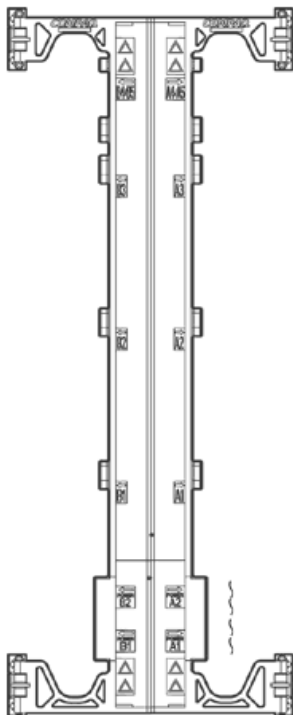(fiber or copper based)

BL p-Class Interconnects
+

OR
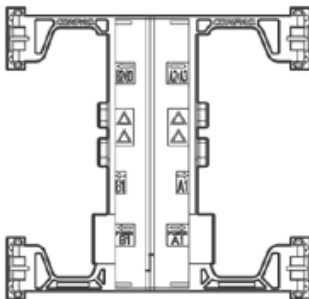Facility DC
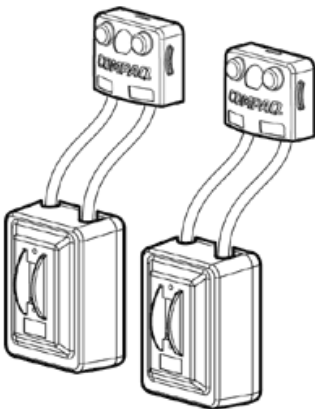BL p-Class power enclosure and power supplies
+

Overview

OR

OR

Scalable bus bar

Mini bus bar

Bus boxes

BL p-Class power distribution

QuickSpecs

Overview

Configuration Steps

● For a complete configuration of the ProLiant BL20p, do the following:

1. Select BL p-Class server blades:
   Single Intel® Pentium® III 1.40 GHz processor, 512-MB ECC SDRAM
   (2 X 256MB) (230040-B21)
   (NOTE: Additional options include processors, memory, and gigabit NICs.)
   PLUS
2. Decide how many BL p-Class Server Blade Enclosures to purchase (each enclosure can hold up to 8 ProLiant BL20p server blades):
   BL p-Class server blade enclosure with 8 Rapid Deployment Pack licenses
   (281404-B21)
   or
   BL p-Class server blade enclosure with Rapid Deployment Pack trial (243564-B21)
   PLUS
3. Select an interconnect. Interconnects are sold in pairs. One pair of interconnects is required with each BL p-Class server blade enclosure:
   BL p-Class RJ-45 Patch Panel (with 32 RJ-45 connectors) (230766-B21)
   or
   BL p-Class RJ-45 Patch Panel 2 (with Fibre Channel pass through and 32 RJ-45 connectors) (306465-B21)
   NOTE: Fibre Channel connectivity is not available on the BL20p.
   or
   BL p-Class C-GbE2 Interconnect Kit (with 12 RJ-45 10/100/1000 T/TX/T external ports) (283192-B21)
   or
   BL p-Class F-GbE2 Interconnect (with 8 LC 1000 SX and 4 RJ-45 10/100/1000 T/TX/T external ports) (283193-B21)
   or
   BL p-Class C-GbE Interconnect Kit (with 4 RJ-45 10/100/1000 T/TX/T and 8 RJ-45 10/100 T/TX external ports (249655-B21)
   or
   BL p-Class F-GbE Interconnect Kit (with 4 LC 1000 SX and 8 RJ-45 10/100 T/TX external ports) (279720-B21)
   PLUS
4. 4. Select BL p-Class power enclosure and power supplies based on configuration. Use p-Class sizing tool to help determine power configuration:
   http://h30099.www3.hp.com/configurator/calc/Power%20Calculator%20Catalog.xls
   NOTE: Power enclosures and supplies are not needed if using facility DC (-48V ± 10%).
   Single phase power enclosure with four hot-plug power supplies (239162-001) (Single-phase power enclosure holds a max of four power supplies; no need to order additional power supplies with this option kit)
   or
   Three-phase power enclosure with six hot-plug power supplies (230769-001) (Three-phase power enclosure holds a max of six power supplies no need to order additional power supplies with this option kit)
   (Power enclosures and power supplies can also be purchased separately see options list for part numbers)
   PLUS
5. 5. Select power distribution: Scalable bus bar - Supports up to 5 server blade enclosures (240560-B21)
   or
   Mini bus bar - Supports up to 3 server blade enclosures (240559-B21)
   or
   Power Bus Box - connects 1 power enclosure to 1 server blade enclosure (240562-B21

QuickSpecs

Standard Features (Server Blade)

Processor	Intel Pentium III FC-PGA2 Processor 1.40 GHz

Upgradeability	Upgradeable to dual processing

Cache Memory	512-KB Level 2 Cache

Chipset	ServerWorks HE- SuperLite Chipset
	NOTE: For more information regarding ServerWorks, please see the following URL: http://www.serverworks.com/products/overview.html.

Memory

	Standard	512MB PC133-MHz Registered ECC SDRAM DIMM Memory (2 X 256 MB)
	Maximum	4096 MB
	NOTE: Memory must be installed in pairs.	

Network Controller	Four NICs total: Three NC3163 Fast Ethernet 10/100T NICs (embedded) with WOL and PXE One 10/100 NIC dedicated to iLO management Two NC3163 NICs are upgradeable to 10/100/1000T using the Dual Gigabit Ethernet NC7780 NIC option kit

Manageability	Integrated Lights-Out (iLO) Management Advanced (ASIC on the System Board)

Internal Storage

	Hard Drives	None shipped standard
	Maximum Internal Storage	145.6 GB (internal drive cage) (2 x 72.8 GB Ultra320, 1" drives)

Expansion Slots	No PCI slots all features are integrated

Product Demo	To view the Product Demo, please see the following URL, then click on "PRODUCT DEMO": http://h18000.www1.hp.com/products/servers/proliant-bl/p-class/index.html.

ProLiant BL p-Class Server Blade Enclosure and Interconnects

ProLiant BL p-Class Server Blade Enclosure	6U (10.5-inch), 19-inch wide Holds up to 8 ProLiant BL20p servers blades 10 bays per server blade enclosure 8 bays for server blades 2 outside bays for interconnect modules (RJ-45 Patch Panel, RJ-45 Patch Panel 2, GbE Interconnect Switch, or GbE2 Interconnect Switch) Server blades blind mate into the server blade enclosure backplane for power and data connections Up to 6 BL p-Class 6U server blade enclosures fit in a 42U rack Server blade management module attached to the back of each BL p-Class 6U server blade enclosure to report events all servers and provide asset and inventory information

ProLiant BL p-Class Power Requirements	Redundant 200V - 240V AC, 30 amp single-phase Redundant 208V 30amp 3-phase 4 wire

Standard Features (Server Blade Enclosure and Interconnects)

ProLiant BL p-Class Interconnect Switch Option

(Two switches per kit)
(Every BL p-Class server blade enclosure requires two interconnect switches OR two RJ-45 patch panels)

Provides up to a 32 to 1 server networking cable reduction per server enclosure depending on the mix of BL20p, BL20p G2, and BL40p servers. Each interconnect switch (two per enclosure) reduces up to sixteen internal server network (NIC) ports to six external ports (four on a modular rear mounting interconnect module and two on the switch front panel). This provides a total of twelve external ports per server blade enclosure. Only one to all twelve external ports may be used per server blade enclosure.

The GbE2 Interconnect Kits (C-GbE2 and F-GbE2) are for applications that require network adapter consolidation to 1000 Mbps (Gigabit Ethernet), advanced network feature support including up to layer 7 switching, BL20p G2 Fibre Channel pass-through, and 10 Gigabit Ethernet bandwidth connectivity to the network. Expandability of both layer 3-7 switching and 10 Gigabit Ethernet is supported with future GbE2 Interconnect Switch upgrade options. The optional GbE2 Storage Connectivity Kit is required for BL20p G2 Fibre Channel pass-through when using the GbE2 Interconnect Switch.

- The ProLiant BL p-Class F-GbE2 Interconnect Kit includes two GbE2 Interconnect Switches and two QuadSX Interconnect Modules that provide eight (8) LC 1000 SX and four (4) RJ-45 10/100/1000 T/TX/T external ports per server blade enclosure.
- The ProLiant BL p-Class C-GbE2 Interconnect Kit includes two GbE2 Interconnect Switches and two QuadT2 Interconnect Modules that provide twelve (12) RJ-45 10/100/1000 T/TX/T external ports per server blade enclosure.

The GbE Interconnect Kits (C-GbE and F-GbE) are for applications that require network adapter consolidation to 100 Mbps (Fast Ethernet).

- The ProLiant BL p-Class F-GbE Interconnect Kit includes two GbE Interconnect Switches and two DualTSX Interconnect Modules that provide four (4) LC 1000 SX and eight (8) RJ-45 10/100 T/TX external ports per server blade enclosure.
- The ProLiant BL p-Class C-GbE Interconnect Kit includes two GbE Interconnect Switches and two QuadT Interconnect Modules that provide four (4) RJ-45 10/100/1000 T/TX/T and eight (8) RJ-45 10/100 T/TX external ports per server blade enclosure.

Also included (per Interconnect Switch):

- One (1) RS-232 DB-9 front panel out-of-band management port
- Redundant cross links ports connecting the two interconnect switches
- Redundant power inputs and on-board redundant fans
- Hot-plug and hot- remove with configuration retention and no need to cable/re-cable
- Power ON, management, and per port status and speed LED indicators
- Reset/power momentary push-button switch
- HP ProLiant BL Interconnect Switch Management Utilities and User Documentation CD
- Fully pre-configured for rapid deployment and immediate operation

The GbE Interconnect Kits (C-GbE and F-GbE) are for applications that require network adapter consolidation to 100 Mbps (Fast Ethernet).

- The ProLiant BL p-Class F-GbE Interconnect Kit includes two GbE Interconnect Switches and two DualTSX Interconnect Modules that provide four (4) LC 1000 SX and eight (8) RJ-45 10/100 T/TX external ports per server blade enclosure.
- The ProLiant BL p-Class C-GbE Interconnect Kit includes two GbE Interconnect Switches and two QuadT Interconnect Modules that provide four (4) RJ-45 10/100/1000 T/TX/T and eight (8) RJ-45 10/100 T/TX external ports per server blade enclosure.

ProLiant BL Interconnect Switch Management System and Utilities:

Full featured web-based and scriptable command line (CLI) interfaces, password protected multi-level user accounts, Telnet, SNMP, BootP client, port mirroring, port-based VLANs and VLAN tagging, EtherChannel compatible multi-port trunking, network time protocol, spanning tree protocol, broadcast/multicast storm control, flow control, human readable/writeable configuration file, TFTP client, IP address security restrictions, auto-MDI/MDIX, auto-negotiation and auto-sensing with full-duplex support, and more.

Standard Features (Server Blade Enclosure and Interconnects)

ProLiant BL p-Class RJ-45 patch panel and Patch Panel 2 (Two patch panels per kit)
(Every BL p-Class server blade enclosure requires two Interconnect switches OR two RJ-45 patch panels)

6U (10.5-inch), Plugs into BL p-Class 6U server blade enclosures

Used to pass NIC signals from all server blades in server blade enclosure out as RJ-45 connections

Supports Gigabit Ethernet network controllers

16 RJ-45 connectors on the back of each BL p-Class 6U RJ-45 patch panel (32 RJ-45 connections per server blade enclosure)

NOTE: The BL20p does not have Fibre Channel functionality. Although the RJ-45 Patch Panel 2 can be used for Ethernet pass through.

Required Network Cabling

10Base-T	Categories 3, 4 or 5 UTP (100 meters) EIA/TIA-568 100-ohm STP (100 meters)
100Base-TX	Category 5 UTP (100 meters) EIA/TIA-568 100-ohm STP (100 meters)
1000Base-T	Category 5 UTP (100 meters) EIA/TIA-568 100-ohm STP (100 meters)
!000Base-SX	50/125 μm Multimode Fiber, 400 MHz/Km (500 meters) 50/125 μm Multimode Fiber, 500 MHz/Km (550 meters) 62.5/125 μm Multimode Fiber, 160 MHz/Km (220 meters) 62.5/125 μm Multimode Fiber, 200 MHz/Km (275 meters)

NOTE: For cabling information, refer to the Web site at: http://www.hp.com/country/us/eng/prodserv/servers.html.

Standard Features (Power System and Rack Information)

ProLiant BL p-Class Power System and Rack Information	**NOTE:** To determine power configuration please refer to the ProLiant BL p-Class Overview and Planning Whitepaper and sizing tool, please see the following URL: http://h18000.www1.hp.com/products/servers/proliant-bl/p-class/20p/documentation.html.

ProLiant BL p-Class Power Enclosure	3U (5.25-inch), 19-inch wide, 29-inch deep (0.48-meter wide, 0.74-meter deep), Dual input single phase and three phase models available.
	BL p-Class power enclosure provides external, shared hot-plug power. Each three-phase power enclosure houses up to six hot-plug power supplies each single-phase power enclosures hold up to four hot-plug power supplies to power the BL p-Class server blades and interconnects Please use the sizing utility to determine the power needed for each configuration http://h30099.www3.hp.com/configurator/powercalcs.asp.
	Power enclosures and power supplies are not needed if using facility DC (-48V DC ± 10%). If using facility DC, only Facility DC Power Connection kit part number (240563-B21) is needed.

BL p-Class Power Distribution	In the ProLiant BL p-Class infrastructure, redundant -48 VDC power (from the power enclosures or facility DC power) is distributed from the power enclosures to the server blade enclosures through the bus bar system. Hinges attach the ProLiant BL bus bars to the rails in a rack. The bus bars swing open from the center to enable easy rear access to the server blades and network cables. Power is distributed redundantly through independent A- and B-sided bus bars.
	Three different power distribution solutions are available depending on the maximum number of server blade enclosures planned for the rack:

- ProLiant BL p-Class scalable bus bar
- ProLiant BL p-Class mini bus bar

NOTE: To support a full 42U rack of BL20p server blades (6 server blade enclosures), two mini bus bars are needed.

- ProLiant BL p-Class power bus box

	Power Enclosures Supported	Server Blade Enclosures Supported	Max. Rack Space Occupied
Scalable Bus Bar	1 or 2	up to 5	36U
Mini Bus Bar	1	up to 3	21U
Power Bus Box	1	1	9U

Required Power Source	Two 30amp redundant power feeds per power enclosure
	Connectors

   –NEMA receptacles

NA 1-phase	L6-30, 250v, 30A 3-wire
NA 3-phase	L15-30, 250V, 30A, 4-wire

Optimized for power cabling from bottom and network cabling from top
For cabling information, refer to the Web site at
http://www.hp.com/country/us/eng/prodserv/servers.html.

Standard Features

ProLiant Essentials Foundation Pack Software for the ProLiant BL Server	ProLiant Essentials Rapid Deployment Pack	Rapid Deployment Pack (RDP) is an automated deployment and provisioning solution for all ProLiant servers. RDP includes the Altiris Deployment Solution and ProLiant Integration Module featuring ProLiant server pre-configured events for OS installation, and optimized software drivers, firmware and management agents. Every RDP CD includes 10-node trial licenses for evaluation purposes. RDP requires a license for each server deployed and are available for purchase with blade servers. For more information, visit http://www.hp.com/servers/rdp.
	HP Systems Insight Manager	HP Systems Insight Manager (HP SIM) help maximize system uptime and performance and reduce system maintenance costs by providing proactive notification of problems before those problems result in unplanned downtime or reduced productivity. HP SIM is easy to set up to work with the Insight Management Agents, integrated Light-Out and Remote Insight Light-Out Edition, and Version Control Agents to deliver robust fault, configuration, and asset management as well as remote administration. With HP Systems Insight Manager customers will also be able to take advantage of role-based security; the ability to manage ProLiant, Integrity, and HP9000 systems; and plug-ins for storage, client, printer, and power management as well as server rapid deployment, performance management, and workload management. For more details on HP Systems Insight Manager visit http://www.hp.com/go/hpsim.
	Management Agents	The Management Agents form the foundation for HP's Intelligent Manageability strategy. They provide direct, browser-based access to in-depth instrumentation built into HP servers, workstations, desktops, and portables, and send alerts to HP Systems Insight Manager and other enterprise management applications in case of subsystem or environmental failures. For additional information about the Management Agents and other management products from HP, please visit the management Web site at http://www.hp.com/servers/manage.
	Subscriber's Choice	Subscriber's Choice Driver and Support Alerts/Notifications is a web-based email subscription service that provides software and driver change notifications for ProLiant products. Sign up at http://www.hp.com/go/subscriberschoice and customize your profile to receive various new alerts as they become available, on a weekly or monthly basis.
	ROMPaq, support software, and configuration utilities	The latest software, drivers, and firmware fully optimized and tested for your ProLiant server and options, available in the RDP CD, SmartStart or downloadable from Software and Drivers download pages, linked from the SmartStart website at http://www.hp.com/servers/smartstart.
	Survey Utility and diagnostics utilities	The most advanced configuration analysis, reporting and troubleshooting utilities used by HP and at your fingertips, available in SmartStart.

NOTE: For more information regarding ProLiant Essentials Software, please see the following URL: http://www.hp.com/servers/proliantessentials.

Optional ProLiant Essentials Value Packs

Optional software offerings that selectively extend the functionality of an Adaptive Infrastructure to address specific business problems and needs:

- Workload Management Pack - provides easier management of complex environments, improving overall server utilization and enabling Windows® 2000 customers for the first time to confidently deploy multiple applications on a single multiprocessor ProLiant Server.
- Performance Management Pack - a performance management solution that identifies and explains hardware performance bottlenecks on ProLiant servers and attached options enabling users to better utilize their valuable resources.

NOTE: Flexible and volume quantity license kits are available for ProLiant Essentials Value Packs. Refer to http://www.hp.com/servers/proliantessentials or the various ProLiant Essentials Value Pack product QuickSpecs for more information.

QuickSpecs

Standard Features

SmartStart	SmartStart is a tool that simplifies single server setup, providing a rapid way to deploy reliable and consistent server configurations. SmartStart 7.00 and later can now deploy the ProLiant BL20P G3 and ProLiant BL40P servers, using the I/O port with an attached USB CD-ROM device. To obtain a copy of SmartStart for your blade server, redeem the coupon that is included with your Blade server or order your copy from the SmartStart web site. For more information, please visit the SmartStart Web site at http://www.hp.com/servers/smartstart.
SmartStart version supported (minimum): SmartStart 6.20

OS Support	Microsoft® Windows
LINUX

NOTE: For a more complete and up-to-date listing of supported OSs and versions, please visit our OS Support Matrix at:http://www.hp.com/go/supportos.
NOTE: For an up-to-date listing of the latest drivers available for the ProLiant BL p-Class, please see: http://h18023.www1.hp.com/support/files/server/us/index.htm.
NOTE: For a more complete and up-to-date information on Linux support, please visit HP Linux Web site at http://h18000.www1.hp.com/products/servers/linux/hpLinuxcert.html . |

Intelligent Manageability	Integrated Lights-Out Advanced (iLO)
Virtual Text and Graphical Remote Console *
Virtual CD-ROM *
Virtual Floppy *
Virtual Power Button Control
Dedicated LAN Connectivity
Automatic IP Configuration via DHCP/DNS/WINS
Industry Standard 128-bit Secure Sockets Layer (SSL) Security
IML and iLO Event Logging
Support for 12 user accounts with customizable access privileges
Automatic Server Recovery-2 (ASR-2)
Insight Manager 7
Redundant ROM
Remote Flash ROM
ROM Based Setup Utility (RBSU)
Advanced Configuration and Power Interface Specification Ready (ACPI)
Server and Interconnect Switch Health Logs
Redundant Power Supply Utility
Pre-Failure Warranty (covers processors, as well as hard drives and memory)
Interconnect Switch Management System and Utilities (interconnect switch option)
Integrated Management Log (IML)
Hot Spare Boot (NOTE: Upon the event of a failed processor or VRM in a multi-processing environment, the system will automatically reboot and use the remaining good processor(s).)
Dynamic sector repairing and drive parameter tracking (with Smart Array controllers)
ProLiant network adapter teaming set-up utility
*NOTE: Advanced features such as Graphical Remote Console and Virtual Floppy are included with the BL p-Class server.

QuickSpecs

HP ProLiant BL20p p-Class Server Blade

Standard Features

| Availability | Power redundancy: Redundant AC feeds into power enclosures, redundant DC feeds from power enclosure to server blade enclosures, N + N redundant power supplies |

Availability Power redundancy: Redundant AC feeds into power enclosures, redundant DC feeds from power enclosure to server blade enclosures, N + N redundant power supplies
Two hot-plug SCSI hard drive bays and integrated RAID (Smart Array 5i) on every server blade (Battery-backed write cache is optional.)
Redundant ROM on each server blade
ECC Memory
Network adapter teaming (network fault tolerance, transmit load balancing, switch-assisted load balancing)
Interconnects switch availability

- Hot-plug and hot- remove with configuration retention and no need to cable/re-cable
- Two network connections per server blade bay (four NICs total) routed to two redundant interconnect switches
- Redundant inter-switch communication and two sets of redundant Ethernet uplink ports per each interconnect switch
- Redundant front panel Ethernet ports per each interconnect switch for diagnostics, management, and additional uplinks
- Redundant serial ports
- Compatibility with PVST+ (GbE2 switch) and 802.1D Spanning tree protocol support for loop-free path redundancy
- Static IEEE 802.3ad (EtherChannel compatible) trunking with automatic port load balancing and failover
- Redundant switch configuration files and operating system firmware images in memory (GbE2 switch)
- Redundant fans per each interconnect switch
- Redundant 1+1 power to each interconnect switch
- Support for ProLiant network adapter teaming
- Redundant configurable community strings and SNMP trap manager hosts
- Redundant configurable syslog servers, DNS servers, and default gateways (GbE2 switch)

Security Power-on password
Administrator's password
Integrated Lights-Out has 12 customizable user accounts and SSL encryption
Integrated Lights-Out can be disabled via a Global Setting
Interconnect switch multilevel user names and passwords, management interface time out period setting, SSH*, SCP secure copy protocol*, port-based IEEE 802.1Q tagged VLANs, RADIUS user authentication and authorization*, and IP address restriction
* GbE2 Interconnect Switch only.

Minimum Rack Requirements Mounts in Compaq/HP, Telco racks and Third Party racks that meet the following criteria:

- Compatible with 19-inch Standard EIA rail sets
  EIA rail-to-rail depth is 29 - 30"
- Cabinet depth must be at least 36-inch deep overall (Additional min. 3.5-inch clearance from rear RETMA rail to rear door, inclusive in the 36-inch overall depth)
- Ample room for top and bottom cable egress (approximately 8 square inches for full rack configuration with patch panel)
- Must be capable of supporting 1600 lb (for full rack configuration)
- Perforated front and rear doors to accommodate front-to-back cooling
- Must have 65% open perforation on server blade enclosure doors to support airflow requirements
- Optimized for use with the HP 10000 Series racks

NOTE: If using HP 7000 Series rack, Rack Extension Kit and High Air Flow Rack Door options are required.

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Standard Features

Rack Airflow Requirements

- Rack 9000 and 10000 series Cabinets
  The increasing power of new high-performance processor technology requires increased cooling efficiency for rack-mounted servers. The 9000 Series and 10000 Series Racks provide enhanced airflow for maximum cooling, allowing these racks to be fully loaded with servers using the latest processors.

- Rack 7000 series Cabinets
  When installing a server with processors running at speeds of 550 MHz or greater in Rack 7000 series racks with glass doors (165753-001 (42U), and 163747-001 (22U)), the new processor technology requires the installation of the High Airflow Rack Door Inserts (327281-B21 (42U), 327281-B22 (42U 6 pack), or 157847-B21 (22U)) to promote enhanced airflow for maximum cooling.

CAUTION: If a third-party rack is used, observe the following additional requirements to ensure adequate airflow and to prevent damage to the equipment:

  - Front and rear doors: If your 42U server rack includes closing front and rear doors, you must allow 830 square inches (5,350 sq cm) of hole evenly distributed from top to bottom to permit adequate airflow (equivalent to the required 64 percent open area for ventilation).
  - Side: The clearance between the installed rack component and the side panels of the rack must be a minimum of 2.75 inches (7 cm).

CAUTION: Always use blanking panels to fill all remaining empty front panel U-spaces in the rack. This arrangement ensures proper airflow. Using a rack without blanking panels results in improper cooling that can lead to thermal damage.

NOTE: For additional information, refer to the Setup and Installation Guide or the Documentation CD provided with the server, or to the server documentation located in the Support section at the following URL:
http://wwss1pro.compaq.com/support/home/index.asp

Service and Support

Three-year limited warranty, including hardware diagnostic support, pre-failure warranty (coverage of hard drives, memory and processors). The warranty is fully supported by HP Services and a worldwide network of resellers and service providers. In addition 90-day's getting started software telephone support may be covered under the warranty or available for an additional fee. Enhancements to warranty services are available through HP Care Pack services.
NOTE: Sever Blade Limited Warranty includes 3 year Parts, 3 year Labor, 3-year on-site support.
NOTE: Server Blade Enclosure and Interconnects Limited Warranty includes 3 year Parts, 3 year Labor, 3-year on-site support.

Care Pack services provide a range of life cycle support options that let you choose the service levels that meet your business requirements, from basic to mission-critical.

A full range of HP Care Pack hardware and software services are available including:

- Installation and start up
- Education courses
- Extended onsite hardware coverage hours from same business day 13 hours, 5 day to 24 hours, 7 days call window with options including 4-hour response or 6-hour Call To Repair
- Comprehensive range of software technical support for Microsoft, Linux, ProLiant Essentials and VMWare-based IT solutions helping to deliver high level of application availability. Response times range from 30 mins for critical problems to 2 hours.
- System Management, Performance Services and Mission Critical Support Solution

HP Care Pack services for ProLiant BL p-Class server blades, cover the server blade and the p-Class blade enclosure that the server blade is installed in as well as interconnects, power enclosure with power supplies and power distribution.

NOTE: For more information on HP Care Pack services, contact any of our worldwide sales offices or resellers or visit our worldwide Web site on the internet at: http://www.hp.com/hps/carepack.
NOTE: For more complete information on HP Services offerings, customers and resellers, please visit us at: http://www.hp.com/hps.
NOTE: Additional information regarding worldwide limited warranty and technical support is available at: http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html.

QuickSpecs

Models

ProLiant BL20p P1400-512KB, 512MB (1P) *230040-B21*	**Processor(s)**	(1) Intel Pentium III 1.40 GHz standard (up to 2 supported)
	Cache Memory	512-KB Level 2 writeback per processor
	Memory	512 MB (Standard) (2 X 256MB) to 4096 MB PC133-MHz Registered ECC SDRAM DIMM Memory
	Network Controller	Three NC3163 Fast Ethernet NIC PCI 10/100 with full WOL and PXE One additional 10/100 port dedicated to iLO Management
	Storage Controller	Smart Array 5i Controller (integrated on system board)
	Hard Drives	None ship standard
	Internal Storage	Up to 145.6-GB maximum (with optional hard drives)
	Optical Drive	None
	Form Factor	Plugs vertically into ProLiant BL p-Class Server Blade Enclosure

Options

ProLiant BL20p Unique Options	Dual NC7780 Gigabit Upgrade Module for ProLiant BL20p	230255-B21
	NOTE: The Dual NC7780 Gigabit Upgrade Module replaces two of the standard NC3163 Fast Ethernet Embedded WOL and PXE NICs to two 10/10/1000T NC7780 NICs.	
	NOTE: The GbE Interconnect Switch options support server NIC speeds to 100 Mbps. It is recommended that the patch panel or GbE2 Interconnect Switch options be used with the Dual NC7780 Gigabit Upgrade Module if server NIC speeds to 1000 Mbps are required.	
ProLiant Essentials Value Pack Software	Rapid Deployment Pack, 10 User, V1.x NOTE: This license allows 10 servers to be managed and deployed via the Deployment Server. NOTE: Not necessary if you purchase the server blade enclosure with 8 Rapid Deployment Pack licenses 281404-B21.	306696-B21
	ProLiant Essentials Performance Management Pack, 10-Server License NOTE: For use with up to 10 servers. Contains 10 licenses with one unique license activation key and documentation.	374055-B21
	ProLiant Essentials Intelligent Networking Pack, Single Server License NOTE: For use with a single server. Contains one license with a unique license activation key and documentation.	372906-B21
	ProLiant Essentials Intelligent Networking Pack, Flexible License NOTE: For use with multiple servers. This part number can be used to purchase multiple licenses with a single activation key. The quantity ordered for this part number will be the quantity of licenses included in the kit in the form of a corresponding activation key. Use the same key to activate all licenses in the actual quantity ordered. For a given order, one kit will be delivered with the activation key, and documentation.	372950-B21
	ProLiant Essentials Intelligent Networking Pack, Tracking License NOTE: For use with signed and implemented Activation Key Agreements only. Purchase of this part number entitles the customer to deploy additional licenses of the product under the terms of the existing Activation Key Agreement. NOTE: Nothing is delivered in conjunction with the purchase of this part number. Visit http://h18004.www1.hp.com/products/servers/proliantessentials/license/akalic.html for more information on Activation Key Agreements.	372951-B21
	NOTE: For more information regarding ProLiant Essentials Software, please see the following URL: http://www.hp.com/servers/proliantessentials NOTE: Flexible and volume quantity license kits are available for ProLiant Essentials Value Packs. Refer to URL http://www.hp.com/servers/proliantessentials or the various ProLiant Essentials Value Pack product QuickSpecs for more information.	
Processor	Pentium III P1400-512KB Processor Option Kit	234277-B21
Memory (SDRAM DIMMs)	2048 MB PC133MHz Registered ECC SDRAM Memory Kit (2x1024 MB)	201695-B21
	1024 MB PC133MHz Registered ECC SDRAM Memory Kit (2x512 MB)	201694-B21
	512 MB PC133MHz Registered ECC SDRAM Memory Kit (2x256 MB)	201693-B21
	256 MB PC133MHz Registered ECC SDRAM Memory Kit (2x128 MB)	201692-B21

QuickSpecs

Options

Hard Drives	*Ultra 320 SCSI – Universal Hot Plug*	
	72.8GB 10,000 rpm, U320 Universal Hard Drive, 1"	286714-B22
	300-GB 10,000 rpm, U320 Universal Hard Drive 1"	350964-B22
	36.4GB 15,000 rpm, U320 Universal Hard Drive, 1"	286776-B22
	72.8GB 15,000 rpm, U320 Universal Hard Drive, 1"	286778-B22

NOTE: All U320 Universal Hard Drives are backward compatible to U2 or U3 speeds.

NOTE: Please see the Hard Drive QuickSpecs for Technical Specifications such as capacity, height, width, interface, transfer rate, seek time, physical configuration, and operating temperature:
U320 Hard Drive QS:
http://h18000.www1.hp.com/products/quickspecs/11531_na/11531_na.HTML

Storage Controllers	Battery Backed Write Cache Enabler Option Kit	255514-B21

NOTE: Please see the following Controller QuickSpecs for Technical Specifications such as PCI Bus, PCI Peak Data Transfer Rate, SCSI Protocols supported, SCSI Peak Data Transfer Rate, Channels, SCSI Ports, Drives supported, Cache, RAID support, and additional information:
http://h18000.www1.hp.com/products/quickspecs/11063_na/11063_na.HTML (Smart Array 5I)

Communications	Dual NC7780 Gigabit Upgrade Module for ProLiant BL20p	230255-B21

NOTE: The Dual NC7780 Gigabit Upgrade Module replaces two of the standard NC3163 Fast Ethernet Embedded WOL (Wake On LAN) NICs to two 10/10/1000T NC7780 NICs.

NOTE: The GbE Interconnect Switch options support server NIC speeds to 100 Mbps. It is recommended that the patch panel or GbE2 Interconnect Switch options be used with the Dual NC7780 Gigabit Upgrade Module if server NIC speeds to 1000 Mbps are required.

BL p-Class Server Blade Enclosures	ProLiant BL p-Class Server Blade Enclosure (ProLiant Essentials Rapid Deployment Pack Trial)	243564-B21
	ProLiant BL p-Class Server Blade Enclosure (8 ProLiant Essentials Rapid Deployment Pack Licenses)	281404-B21

QuickSpecs

Options

BL p-Class Interconnects	ProLiant BL p-Class RJ-45 Patch Panel (pair)	230766-B21
	NOTE: Only one interconnect kit required per server blade enclosure.	
	ProLiant BL p-Class RJ-45 Patch Panel 2 (pair)	306465-B21
	NOTE: Only one interconnect kit required per server blade enclosure.	
	ProLiant BL p-Class C-GbE2 Interconnect Kit (with pair of GbE2 Interconnect Switches and two QuadT2 Interconnect Modules)	283192-B21
	NOTE: Only one interconnect kit required per server blade enclosure.	
	ProLiant BL p-Class F-GbE2 Interconnect Kit (with pair of GbE2 Interconnect Switches and two QuadSX Interconnect Modules)	283193-B21
	NOTE: Only one interconnect kit required per server blade enclosure.	
	ProLiant BL p-Class C-GbE Interconnect Kit (with pair of GbE Interconnect Switches and two QuadT Interconnect Modules)	249655-B21
	NOTE: Only one interconnect kit required per server blade enclosure.	
	NOTE: The GbE Interconnect Switch supports server NIC speeds to 100 Mbps. It is recommended that the GbE2 Interconnect Kit or patch panel be used if server NIC speeds to 1000 Mbps are required. NOTE: To meet applicable radio frequency (RF) emission limits, the sidewall panels on the ends of any individual rack or a series of coupled racks and the front and rear doors must be installed in any racks containing more than one ProLiant BL p-Class GbE Interconnect Kit.	
	ProLiant BL p-Class F-GbE Interconnect Kit (with pair of GbE Interconnect Switches and two DualTSX Interconnect Modules)	279720-B21
	NOTE: Only one interconnect kit required per server blade enclosure.	
	NOTE: The GbE Interconnect Switch supports server NIC speeds to 100 Mbps. It is recommended that the GbE2 Interconnect Kit or patch panel be used if server NIC speeds to 1000 Mbps are required. NOTE: To meet applicable radio frequency (RF) emission limits, the sidewall panels on the ends of any individual rack or a series of coupled racks and the front and rear doors must be installed in any racks containing more than one ProLiant BL p-Class GbE Interconnect Kit.	

BL p-Class Power options	NOTE: Use p-Class sizing tool to help determine power configuration: http://h30099.www3.hp.com/configurator/calc/Power%20Calculator%20Catalog.xls	
	Single Phase Redundant Power Enclosure with 4 power supplies	239162-001
	(Single Phase Power Enclosure holds a maximum of 4 power supplies; no need to order additional power supplies with this option kit)	
	(Single Phase Power Enclosure holds a maximum of 4 power supplies; no need to order additional power supplies with this option kit)	
	3 Phase Redundant Power Enclosure with 6 power supplies	230769-001
	(3 Phase Power Enclosure holds a maximum of 4 power supplies; no need to order additional power supplies with this option kit)	
	(3 Phase Power Enclosure holds a maximum of 4 power supplies; no need to order additional power supplies with this option kit)	
	Single Phase Power Enclosure (empty) (Holds up to 4 power supplies; power supplies are not included in this kit)	231710-001
	3 Phase Power Enclosure (empty) (Holds up to 6 power supplies; power supplies are not included in this kit)	231709-001
	Single Power Supply	239161-B21
	Facility DC Power Connection	240563-B21

Options

Power Distribution	ProLiant p-Class Scalable Bus Bar	240560-B21
	ProLiant p-Class Mini Bus Bar	240559-B21
	ProLiant p-Class Mini Bus Bar	240562-B21

Diagnostic Options	ProLiant p-Class Diagnostic Station	230743-B21

NOTE: The Diagnostic Station allows access to the ProLiant BL20p server blade and the BL p-Class interconnect switch outside of the server enclosure. The option provides power and a data interface so that "offline" upgrade and diagnostic functions may be performed.

USB Options	USB Easy Access Keyboard (Carbonite/Silver)	DC168B-ABA
	USB Optical Scroll Mouse (Carbonite)	DD441B
	USB 1.44-MB External Diskette Drive (Carbonite)	DC141B
Custom Builder	Please see the Enterprise Configurator for configuration assistance at: http://www.hp.com/products/configurator.	

HP Rack 10000 Series	S10614 (14U) Rack Cabinet - Shock Pallet	292302-B22
(Graphite Metallic)	HP Rack 10647 (47U) – Pallet	245160-B21
	HP Rack 10647 (47U) – Crated	245160-B23
	HP Rack 10642 (42U) – Pallet	245161-B21
	HP Rack 10642 (42U) – Shock Pallet	245161-B22
	HP Rack 10642 (42U) – Crated	245161-B23
	HP Rack 10636 (36U) – Pallet	245162-B21
	HP Rack 10636 (36U) – Shock Pallet	245162-B22
	HP Rack 10636 (36U) – Crated	245162-B23
	HP Rack 10622 (22U) – Pallet	245163-B21
	HP Rack 10622 (22U) – Shock Pallet	245163-B22
	HP Rack 10622 (22U) – Crated	245163-B23

NOTE: -B21 (pallet) used to ship empty racks shipped on a truck
-B22 (shock pallet) used to ship racks with equipment installed (by custom systems, VARs and Channels)
-B23 (crated) used for air shipments of empty racks
Not all HP equipment is qualified to be shipped in the Rack 10000 series.

NOTE: Please see the Rack 10000 QuickSpecs for Technical Specifications such as height, width, depth, weight, and color:
http://h18000.www1.hp.com/products/quickspecs/10995_na/10995_na.HTML

NOTE: For additional information regarding Rack Cabinets, please see the following URL:
http://h18000.www1.hp.com/products/servers/proliantstorage/racks/index.html.

Rack Options for HP	HP Rack Plinth Kit (Carbon)	251960-B21
Rack 10000 Series	HP Rack Light Kit (Neon)	361589-B21
	800mm Wide Stabilizer Kit (Graphite)	255488-B21

NOTE: Supported by the Rack 10842 cabinet only.

	600mm Stabilizer Kit – Graphite	246107-B21
	Baying Kit for Rack 10000 series (Carbon)	248929-B21
	42U Side Panel – Graphite Metallic	246099-B21
	110V Fan Kit (Graphite)	257413-B21

NOTE: Roof Mount Includes power cord with IEC320-C13 to Nema 5-15P.

	220V Fan Kit (Graphite)	257414-B21

NOTE: Roof Mount Includes power cord with IEC320-C13 to Nema 6-15P.

Options

	36U Side Panel – Graphite Metallic	246102-B21
	47U Side Panel – Graphite Metallic	255486-B21
	9000/10000 Series Offset Baying Kit (42U)	248931-B21

NOTE: This kit can be used to connect 9000 and 10000 series racks of the same U height together. Kit contents include hardware for connecting racks and a panel to cover the 100mm gap at the rear of the two racks.

NOTE: For additional information regarding Rack Options, please see the following URL: http://h18000.www1.hp.com/products/servers/proliantstorage/rack-options/index.html.

	Ballast Option Kit	120672-B21
	9000/10000 Series Offset Baying Kit (42U)	248931-B21

NOTE: This kit can be used to connect 9000 and 10000 series racks of the same U height together. Kit contents include hardware for connecting racks and a panel to cover the 100mm gap at the rear of the two racks.

NOTE: For additional information regarding Rack Cabinets, please see the following URL: http://h18000.www1.hp.com/products/servers/proliantstorage/rack-options/index.html

	Rack Rail Adapter Kit (25" depth)	120675-B21
	100 kg Sliding Shelf	234672-B21
	Monitor/Utility Shelf - Graphite	253449-B21
	Depth Adjustable Fixed Rail	332558-B21
	Cable Management D-Rings Kit	168233-B21
	Server Console Switch 1 x 4 port (100-230 VAC)	400336-001
	IP Console Switch Box, 1 x 1 x 16	262585-B21
	IP Console Switch Box, 3 x 1 x 16	262586-B21
	CPU to Server Console Cable, 12'	110936-B21
	CPU to Server Console Cable, 3'	110936-B24
	CPU to Server Console Cable, 7'	110936-B25
	IP CAT5 Cable 3', 4 pack	263474-B21
	IP CAT5 Cable 6', 8 pack	263474-B22
	IP CAT5 Cable 12', 8 pack	263474-B23
	IP CAT5 Cable 20', 4 pack	263474-B24
	IP CAT5 Cable 40', 1 pack	263474-B25
	TFT5600 Rack Keyboard Monitor	221546-001
	TFT7210R Rack Mounted 17" Monitor	348373-B21

NOTE: For a complete list of Monitors please view the following URL: http://h18004.www1.hp.com/products/monitors/

	1U Rack Keyboard & Drawer (Carbon)	257054-001

NOTE: For additional information regarding Rack Options, please see the following URL: http://h18000.www1.hp.com/products/servers/proliantstorage/rack-options/index.html.

Rack Options for HP, Compaq-branded, Third Party and Telco racks	Telco rack-mounting hardware kit for ProLiant BL e-Class Server Blade Enclosure	266076-B21
	Enclosure Shipping Bracket Kit	293119-B21

NOTE: When shipping an enclosure in a rack shipping brackets must be installed to the rack.

Options

Service and Support Offerings (HP Care Pack Services)

NOTE: The HP Care Pack services for ProLiant BL p-Class server blades, cover the server blade and the p-Class blade enclosure that the server blade is installed in as well as interconnects, power enclosure with power supplies and power distribution.

Hardware Services On-site Service

Next Business Day On-site Service, 5-Day x 9-Hour Coverage, 3 Years	UA203A
Next Business Day On-site Service, 5-Day x 9-Hour Coverage, 3 Years, Electronic	UA203E
4-Hour On-site Service, 5-Day x 13-Hour Coverage, 3 Years	UA204A
4-Hour On-site Service, 5-Day x 13-Hour Coverage, 3 Years, Electronic	UA204E
4-Hour On-site Service, 7-Day x 24-Hour Coverage, 3 Years	UA205A
4-Hour On-site Service, 7-Day x 24-Hour Coverage, 3 Years, Electronic	UA205E
6-Hour Call to Repair, On-site Service, 7-Day x 24-Hour Coverage, 3 Years	UA206A
6-Hour Call to Repair, On-site Service, 7-Day x 24-Hour Coverage, 3 Years, Electronic	UA206E

Installation & Start-up Services

ProLiant BL p-Class Blade Server Hardware Installation	UA219A
ProLiant BL p-Class Blade Server Hardware Installation, Electronic	UA219E
ProLiant BL p-Class Enclosure and Server Blade Hardware Installation	U4971A
ProLiant BL p-Class Enclosure and Server Blade Hardware Installation, Electronic	U4971E
Provides for the Installation and Start-up of Compaq's Rapid Deployment Pack on a Customer supplied server designated as a Deployment Server. Includes the deployment of a single server. This new server will be deployed using either one of the pre-configured scripts or an image. In addition, the service will provide for the capture and storage of the configuration of the newly deployed server and orientation on product usage. To be delivered during standard office ours, standard office days.	U5683A
Provides for the Installation and Start-up of Compaq's Rapid Deployment Pack on a Customer supplied server designated as a Deployment Server. Includes the deployment of a single server. This new server will be deployed using either one of the pre-configured scripts or an image. In addition, the service will provide for the capture and storage of the configuration of the newly deployed server and orientation on product usage. To be delivered during standard office ours, standard office days. Electronic.	U5683E

NOTE: For more information, customer/resellers can contact
http://www.hp.com/hps/carepack/services/

QuickSpecs

Memory

ProLiant BL20p Server Blade (1P Model)
Standard Memory

512-MB PC133 MHz Registered ECC SDRAM DIMM installed (2 x 256-MB SDRAM DIMM)

Standard Memory Plus Optional Memory

Up to 2560-MB of SDRAM DIMM memory is available with the installation of optional SDRAM DIMM memory expansion kits.

Standard Memory Replaced with Optional Memory

Up to 4096-MB of SDRAM DIMM memory is available with the removal of standard memory and the installation of optional SDRAM DIMM memory expansion kits.

Memory		Slot			
		1	2	3	4
Standard	512 MB	256 MB	256 MB	empty	empty
Optional	2560 MB	256 MB	256 MB	1024 MB	1024 MB
Maximum	4096 MB	1024 MB	1024 MB	1024 MB	1024 MB

Following are memory options available from HP:
- 2048-MB PC133MHz Registered ECC SDRAM Memory Kit (2 x 1024 MB)   201695-B21
- 1024-MB PC133MHz Registered ECC SDRAM Memory Kit (2 x 512 MB)   201694-B21
- 512-MB PC133MHz Registered ECC SDRAM Memory Kit (2 x 256 MB)   201693-B21
- 256-MB PC133MHz Registered ECC SDRAM Memory Kit (2 x 128 MB)   201692-B21

QuickSpecs

Technical Specifications

ProLiant BL p-Class Server Blade Enclosure	Dimensions	Height	10.5 in (26.67 cm)	
		Width	17.60 in (44.70 cm)	
		Depth	28.86 in (73.30 cm)	
	Input Specifications	Rated input voltage	-43 VDC to -53 VDC	Nominal -48 VDC
		Rated input current	62.5 A at -48 VDC	
		Rated input power	3000 W	
	Individual server blade bay ratings	Rated input voltage	-43 VDC to -53 VDC	Nominal -48 VDC
		Rated input current	6.25 A at -48 VDC	
		Rated input power	300 W	
	Temperature Range	Operating	50° to 95° F (10° to 35° C)	
		Non-operating	-22° to 140° F (-30° to 60° C)	
	Relative Humidity (non-condensing)	Operating	20% to 80%	
		Non-operating	5% to 95%	
	Wet Bulb Temperature	Operating	82.4° F (28° C)	
		Non-operating	101.7° F (38.7° C)	

NOTE: Operating temperature has an altitude derating of 34° F per 1,000 ft (1° C per 304.8 m). No direct sunlight. Upper operating limit is 10,000 ft or 70Kpa (3,048 m or 10.1 psia). Upper non-operating limit is 30,000 ft or 30.3 KPa (9,144 m or 4.4 psia). Storage maximum humidity of 95% is based on a maximum temperature of 113° F (45° C). Altitude maximum for storage is 70 KPa.

Operating Performance Specifications for ProLiant BL20p Server Blade	Dimensions	Height	1.69 in (4.29 cm)
		Width	10.29 in (26.14 cm)
		Depth	28.00 in (71.12 cm)
	Weight (maximum)	18.0 lb (8.17 kg)	
	Temperature Range	Operating	50° to 95° F (10° to 35° C)
		Shipping	-40° to 140° F (-40° to 60° C)
		Storage	-4° to 140° F (-20° to 60° C)
	Relative Humidity (non-condensing)	Operating	10% to 90%
		Shipping	10% to 90%
		Storage	10% to 95%
	Maximum Wet Bulb Temperature	82° F (28° C)	

NOTE: Operating temperature has an altitude derating of 34° F per 1,000 ft (1° C per 304.8 m). No direct sunlight. Upper operating limit is 10,000 ft or 70Kpa (3,048 m or 10.1 psia). Upper non-operating limit is 30,000 ft or 30.3 KPa (9,144 m or 4.4 psia). Storage maximum humidity of 95% is based on a maximum temperature of 113° F (45° C). Altitude maximum for storage is 70 KPa.

Technical Specifications

Operating and Performance Specifications for RJ-45 Patch Panel	Dimensions	Height	10.405 in (26.43 cm)
		Width	1.535 in (3.899 cm)
		Depth	27.697 in (70.35 cm)
	Capability	IEEE 802.2, 802.3, 802.3u	
	Network Transfer Rate	10 Base-T (half-duplex)	10 Mbps
		10 Base-T (full-duplex)	20 Mbps
		100 Base-TX (half-duplex)	100 Mbps
		100 Base-TX (full-duplex)	200 Mbps
		1000 Base-TX (full-duplex)	1000 Mbps
	Connector	RJ-45	
	Cable Support	10 Base-TX	Categories 3, 4, or 5 UTP (2 or 4 pair); up to 328 ft (100 m)
		100 Base-TX	Category 5 UTP (2 pair); up to 328 ft (100 m)
		1000 Base-TX	Category 5E (4 pair); up to 328 ft (100 m)
	Power Requirements	200 mA at + 5V DC; 500 mA at -48V	
	Temperature Range	Operating	50° to 95° F (10° to 35° C)
		Non-operating	-22° to 140° F (-30° to 60° C)
	Relative Humidity (non-condensing)	Operating	20% to 80%
		Non-operating	5% to 95%
	Wet Bulb Temperature	Operating	82.4° F (28° C)
		Non-operating	101.7° F (38.7° C)

NOTE: Operating temperature has an altitude derating of 34° F per 1,000 ft (1° C per 304.8 m). No direct sunlight. Upper operating limit is 10,000 ft or 70Kpa (3,048 m or 10.1 psia). Upper non-operating limit is 30,000 ft or 30.3 KPa (9,144 m or 4.4 psia). Storage maximum humidity of 95% is based on a maximum temperature of 113° F (45° C). Altitude maximum for storage is 70 KPa.

Operating and Performance Specifications for GbE2 Interconnect Switch	Dimensions	Height	10.405 in (26.43 cm)
		Width	1.535 in (3.899 cm)
		Depth	27.697 in (70.35 cm)
	Weight	12.0 lb/5.4 kg per interconnect switch	
	Performance	24 Gbps External port bandwidth per server blade enclosure (full duplex)	
		Forwarding rate 1.5 million pps per gigabit port (64-byte packets)	
		Auto-MDI/MDIX, auto-negotiation and auto-sensing with full-duplex support	
	Forwarding Mode	Store and forward	
	MAC Addresses	2,048 per interconnect switch	
	Forwarding table age time	Maximum age: 1 to 65535 seconds; default: 300 seconds	
	Memory	128MB Main, 32MB flash and 2MB packet buffer per interconnect switch	
	Compliance	IEEE 802.3, 802.3u, 802.3ab, 802.3x, 802.3z (F-GbE2 only), 802.1D, 802.3ac, 802.3ad (Static), and 802.1Q	
		SNMP v1 (RFC 1157), MIB-II (RFC 1213), Bridge MIB (RFC 1493), Interface Group MIB (RFC 2863), Ethernet MIB (RFC 1643), 802.1Q Extended Bridge MIB, Entity MIB (RFC 2037), RADIUS Authentication MIB, 802.3-2002 MIB, SNMP Trap Convention (RFC 1215), Bridge Trap (RFC 1493), Remote Monitoring Traps (RFC 1757) and HP Enterprise Switch MIBs and Environmental Traps	
		RADIUS (RFC 2138), Telnet (RFC 854), TFTP client (RFC 783), SSH v1.5, SCP v1.5, NTP v2 (RFC 1119), BOOTP client (RFC 2132), and XModem	
	Network Transfer Rate	10 Base-T (half-duplex)	10 Mbps
		10 Base-T (full-duplex)	20 Mbps
		100 Base-TX (half-duplex)	100 Mbps
		100 Base-TX (full-duplex)	200 Mbps

Technical Specifications

		1000 Base-TX (half-duplex)	1000 Mbps
		1000 Base-TX (full-duplex)	2000 Mbps
		1000 Base-SX (full-duplex)	2000 Mbps

Connector	12 RJ-45, 2 DB-9 (C-GbE2 Interconnect Kit)
	8 LC fiber, 4 RJ-45, 2 DB9 (F-GbE2 Interconnect Kit)
	16 LC SFP transceiver slots (GbE2 Storage Connectivity Kit)

EMI	FCC Class A
	ICES-003 Class A
	AS/NZS 3548 Class A
	VCCI Class A

Safety	UL/CUL Listed Accessory
	CE

Power Requirements	-48V DC: 2040 mA, 98 W maximum (per interconnect switch without GbE2 Storage Connectivity Kit)
	-48V DC: 2355 mA, 113 W maximum (per interconnect switch with GbE2 Storage Connectivity Kit)

Temperature Range	Operating	50° to 95° F (10° to 35° C)
	Non-operating	-22° to 140° F (-30° to 60° C)

Relative humidity (non-condensing)	Operating	20% to 80%
	Non-operating	5% to 95%

Wet Bulb Temperature	Operating	82.4° F (28° C)
	Non-operating	101.7° F (38.7° C)

NOTE: Operating temperature has an altitude derating of 34° F per 1,000 ft (1° C per 304.8 m). No direct sunlight. Upper operating limit is 10,000 ft or 70Kpa (3,048 m or 10.1 psia). Upper non-operating limit is 30,000 ft or 30.3 KPa (9,144 m or 4.4 psia). Storage maximum humidity of 95% is based on a maximum temperature of 113° F (45° C). Altitude maximum for storage is 70 KPa.

Technical Specifications

Operating and Performance Specifications for Interconnect GbE Switch	Dimensions	Height	10.405 in (26.43 cm)
		Width	1.535 in (3.899 cm)
		Depth	27.697 in (70.35 cm)
	Weight	11.5 lb/5.2 kg per interconnect switch	
	Performance	9.6 Gbps external port bandwidth per server blade enclosure (full duplex)	
		Forwarding rate 0.15 million pps per 10/100 port, 1.5 million pps per gigabit port, (64-byte packets)	
		Non-blocking, full-wire speed for all connections	
		Auto-MDI/MDIX, auto-negotiation and auto-sensing with full-duplex support	
	Forwarding Mode	Store and forward	
	MAC Addresses	8,191 per interconnect switch; MAC address based filtering and MAC address packet priority configuring	
	Forwarding table age time	Maximum age: 1 to 1,000,000 seconds; default: 300 seconds	
	Memory	32MB Main, 6MB flash and 16MB packet buffer per interconnect switch	
	Compliance	IIEEE 802.3, 802.3u, 802.3ab, 802.3x, 802.3z (F-GbE only), 802.1D, 802.1p, 802.3ac, 802.3ad (Static), and 802.1Q	
		SNMP v1 (RFC 1157) and RMON v1 (RFC 1757) groups 1, 2, 3, and 9 MIB-II (RFC 1213), Bridge MIB (RFC 1493), Interface Group MIB (RFC 2863), Ethernet MIB (RFC 1643), 802.1Q Extended Bridge MIB (RFC 2674), Entity MIB (RFC 2037), SNMP Trap Convention (RFC 1215), Bridge Trap (RFC 1493), Remote Monitoring Traps (RFC 1757), and HP Enterprise Switch MIBs and Environmental Traps	
		IGMP v1 (RFC 1112), IGMP v2 (RFC 2236), SNTP (RFC 1361), Telnet (RFC 854), TFTP client (RFC 783), BOOTP client, (RFC 2132), DHCP client, (RFC 2131) and ZModem	
	Network Transfer Rate	10 Base-T (half-duplex)	10 Mbps
		10 Base-T (full-duplex)	20 Mbps
		100 Base-TX (half-duplex)	100 Mbps
		100 Base-TX (full-duplex)	200 Mbps
		1000 Base-TX (half-duplex)	1000 Mbps
		1000 Base-TX (full-duplex)	2000 Mbps
		1000 Base-SX (full-duplex)	2000 Mbps
	Connector	12 RJ-45, 2 DB-9 (C-GbE Interconnect Kit) 4 LC fiber, 8 RJ-45, 2 DB-9 (F-GbE Interconnect Kit)	
	EMI	FCC Class A	
		ICES-003 Class A	
		AS/NZS 3548 Class A	
		VCCI Class A	
	Safety	UL/CUL Listed Accessory	
		CE	
	Power Requirements	-48V DC: 1050 mA, 50 W maximum (per interconnect switch)	
	Temperature Range	Operating	50° to 95° F (10° to 35° C)
		Non-operating	-22° to 140° F (-30° to 60° C)
	Relative humidity (non-condensing)	Operating	20% to 80%
		Non-operating	5% to 95%
	Wet Bulb Temperature	Operating	82.4° F (28° C)
		Non-operating	101.7° F (38.7° C)

NOTE: Operating temperature has an altitude derating of 34° F per 1,000 ft (1° C per 304.8 m). No direct sunlight. Upper operating limit is 10,000 ft or 70Kpa (3,048 m or 10.1 psia). Upper non-operating limit is 30,000 ft or 30.3 KPa (9,144 m or 4.4 psia). Storage maximum humidity of 95% is based on a maximum temperature of 113° F (45° C). Altitude maximum for storage is 70 KPa.

Technical Specifications

Operating and Performance Specifications for Power Enclosures			Single-Phase Model	Three-Phase Model
Dimensions	Height		5.25 in (13.34 cm)	5.25 in (13.34 cm)
	Width		17.60 in (44.7 cm)	17.60 in (44.7 cm)
	Depth		27.15 in (68.96 cm)	27.15 in (68.96 cm)
Weights	No hot-plug power supplies		47.5 lb (21.55 kg)	47.5 lb (21.55 kg)
	All hot-plug power supplies		99.5 lb (45.13 kg)	125.5 lb (56.93 kg)
Input requirements	Rated input voltage		200 VAC to 240 VAC	200 VAC to 240 VAC line to line
	Rated input frequency		50 Hz to 60 Hz	50 Hz to 60 Hz
	Rated input current per side		24A	24A per phase
	Rated input power per side		5760 W	9976 W
	Power cord		1 IEC 309 3-pin, 32A per side	1 IEC 309 5-pin, 32A per side
Output voltage specifications	Rated output voltage		-48.8 VDC to -54 VDC	-48.8 VDC to -54 VDC
	Rated output current		99A	170A
	Rated output power		4298 W	8310 W
	Nominal Power		4158 W at 208 VAC	7202 W at 208 VAC
Ambient Temperature Range (see **NOTE**)	Operating		50° to 95° F (10° to 35° C)	50° to 95° F (10° to 35° C)
	Shipping		-22° to 140° F (-30° to 60° C)	-22° to 140° F (-30° to 60° C)
Relative Humidity non-condensing (see **NOTE**)	Operating		20% to 80%	20% to 80%
	Non-operating		5% to 95%	5% to 95%
Wet Bulb Temperature	Operating		82.4° F (28° C)	82.4° F (28° C)
	Non-operating		101.7° F (38.7° C)	101.7° F (38.7° C)

NOTE: Operating temperature has an altitude derating of 34° F per 1,000 ft (1° C per 304.8 m). No direct sunlight. Upper operating limit is 10,000 ft or 70Kpa (3,048 m or 10.1 psia). Upper non-operating limit is 30,000 ft or 30.3 KPa (9,144 m or 4.4 psia). Storage maximum humidity of 95% is based on a maximum temperature of 113° F (45° C). Altitude maximum for storage is 70 KPa.

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Technical Specifications

Operating and Performance Specifications for Power Distribution Devices		Power Bus Box	Mini Bus Bar	Scalable Bus Bar
Power enclosure or facility DC supported (3U each)		1	1	2
Server blade enclosures		1	3	6
Total rack height of supported enclosures		9U	21U	36U
Dimensions				
Height		5.1 in (12.95 cm)	19.45 in (49.40 cm)	48.57 in (123.37 cm)
Width		3.6 in (9.14 cm) each	19.74 in (50.14 cm)	19.74 in (50.14 cm)
Depth		3.25 in (8.26 cm)	2.2 in (5.59 cm)	2.2 in (5.59 cm)
Weight		3.62 lb (1.64 kg)	13.2 lb (5.9 kg)	26 lb (11.79 kg)
Rated operating voltage		-43.2 VDC to -54 VDC	43.2 VDC to -54 VDC	-43.2 VDC to -54 VDC
Max total power supported		3000 W	9000 W	15,000 W
Total max input current at minimum voltage		69.44 A at -43.2VDC	208.32 A at -43.2 VDC	347.2 A at -43.2 VDC (equivalent of 175A per feed)
Total max input current at nominal voltage		62.5 A at -48VDC	187.5 A at -48 VDC	312.5 A at -48 VDC (equivalent of 175A per feed)
Max current per power feed		70A	210A	210A
Max local ambient temperature		149° F (65° C)	149° F (65° C)	

NOTE: All systems support redundant A & B feeds. Scalable bus bar supports dual A and dual B feeds.

QuickSpecs

Technical Specifications

Operating and Performance Specifications for Facility DC	Voltage	Nominalinput voltage	-48 VDC
		Operating voltage range	-48VDC ± 10% or -43.2 VDC to -52.8 VDC
		Max input voltage slew rate	0.5V/uS
		Redundant feed voltages*	*A and B feeds must differ by no more than 5VDC during steady state operation
		Ripple/Noise	480 mV PARD**
		Overshoot	Must remain within regulation limits on all feeds during startup or shutdown
		Voltage Transients	Must not exceed -60 VDC
	Current	Max steady state input current	62.5A per server blade enclosure installed at -48VDC
		Max steady state current per feed/total	
		Power bus boxes	70 A/70A
		Mini bus bars	210 A/210A
		Scalable bus bars	210 A/350A or equivalent of 175A per feed*

In-rush current	Must support up to 2X the maximum operating current per server blade enclosure (125 A) for up to 1.0 mS
Input over-current	Customer provided fusing for facility DC feeds that protects the system from catastrophic over-current within 20 uS. Fuse should sustain all in-rush and operating currents.
Max Input Current Slew Rate	1A/uS
Max Input Curent Slew Rate	3000W per server blade enclosure
Connection and Cables	HP provided facility DC cable connection kit:

- The facility DC connection kit supports the connection of up to four -48VDC, RETURN pairs and ground.

The power cable assemblies consist of 1/0AWG, color-coded, flexible cable rated at 105° C, terminated with bus mating connectors at one end and unterminated at the other end. The cable length provided enables the customer to route to a fuse panel within or adjacent to the rack.

NOTE: *All systems support redundant A and B feeds. Scalable bus bars support dual A and dual B feeds.
** Periodic and random noise (PARD). Maximum allowable peak-to-peak ripple and noise (as measured at the load on any output channel). The ripple and noise is measured over a 20 Hz to 100 MHz frequency band. A resistive load (non-electronic) is used for this measurement. Each output is by-passed to return by a 10uF tantalum capacitor with an ESR less than 100 milli-Ohms in parallel with a 0.47 uF ceramic capacitor, at the point of load. The load cable is 12 feet of twisted wire capable of carrying the current. The printed wiring board assembly is installed in its enclosure for this measurement, or the measurement leads are properly shielded with Earth grounds applied to the insert.